Exhibit 12

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TQ DELTA, LLC, Plaintiff; v. 2WIRE, INC., Defendant.	Civil Action No. 13-1835-RGA

MEMORANDUM OPINION

Brian E. Farnan, Michael J. Farnan, FARNAN LLP, Wilmington, DE; Peter J. McAndrews, Paul W. McAndrews, Rajendra A. Chiplunkar, Ashley M. Ratycz, MCANDREWS, HELD & MALLOY, LTD., Chicago, IL,

Attorneys for Plaintiff.

Jody C. Barillare, MORGAN LEWIS & BOCKIUS LLP, Wilmington, DE; Brett Schuman, Rachel M. Walsh, GOODWIN PROCTER LLP, San Francisco, CA; Douglas J. Kline, GOODWIN PROCTER LLP, Boston, MA; Andrew S. Ong, GOODWIN PROCTER LLP, Redwood City, CA; Cindy Chang, GOODWIN PROCTER LLP, New York, NY,

Attorneys for Defendant.

August 3, 2021

ANDREWS, U.S. DISTRICT JUDGE:

Before the Court is Defendant's Motion for Summary Judgment of Non-Infringement of the Family 4 Patents (D.I. 1462) and Plaintiff's Motion for Summary Judgment of Infringement of the Asserted Claims of the Family 4 Patents (D.I. 1468). I have reviewed the parties' briefing. (D.I. 1463, 1469, 1514, 1518, 1532, 1537).

I. BACKGROUND

Plaintiff TQ Delta filed suit against Defendant 2Wire alleging infringement of twenty-four patents that span six different patent families. (D.I. 6). The Court divided the case into separate trials based on the patent families. (D.I. 280). This motion concerns the Family 4 Patents, U.S. Patent Nos. 7,292,627 ("the '627 Patent"), 8,090,008 ("the '008 Patent"), and 8,073,041 ("the '041 Patent"). The patents-at-issue are directed to a system and method for scrambling the phase characteristics of carrier signals. The Accused Products are Customer Premise Equipment ("CPE"). (D.I. 1479-1, Exh. A at 48 of 163). Plaintiff alleges infringement of Claim 26 of the '627 Patent, Claim 14 of the '008 Patent, and Claim 14 of the '041 Patent.

Claim 26 of the '627 Patent depends on Claim 20. Claim 20 recites:

> 20. A multicarrier modulation transceiver that uses a transmission signal having a plurality of carrier signals for modulating an input bit stream, each carrier signal having a phase characteristic associated with the input bit stream, wherein the multicarrier modulation transceiver is capable of associating each carrier signal with a value determined independently of any input bit value carried by that carrier signal, computing a phase shift for each carrier signal based on the value associated with that carrier signal and combining the phase shift computed for each carrier signal with the phase characteristic of that carrier signal so as to substantially scramble the phase characteristics of the plurality of carrier signals.

'627 Patent at cols. 11:64-12:11. Claim 26 recites:

> 26. The transceiver of claim 20 wherein the value varies with each DMT symbol.

Id. at col. 12:30-31.

Claim 14 of the '008 Patent recites:

> 14. A multicarrier system including a first transceiver that uses a plurality of carrier signals for modulating a bit stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of:
>
> associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator;
>
> computing a phase shift for each carrier signal based on the value associated with that carrier signal; and
>
> combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the plurality of carrier signals, wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value.

'008 Patent at cols. 11:41-12:14.

Claim 14 of the '041 Patent recites:

> 14. A multicarrier system including a first transceiver that uses a plurality of carrier signals for receiving a bit stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of receiving the bit stream, wherein:
>
> each carrier signal is associated with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined by a pseudo-random number generator,
>
> a phase shift for each carrier signal is based on:
>
> > the value associated with that respective carrier signal, and
> >
> > the combining of a phase shift for each carrier signal with the phase characteristic of that respective carrier signal so as to substantially scramble the phase characteristics of the plurality of carrier signals
>
> multiple carrier signals corresponding to the plurality of phase shifted and scrambled carrier signals are used by the first multicarrier transceiver to demodulate a same input bit value of the received bit stream.

'041 Patent at cols. 11:42-12:16.

The parties have filed dueling motions for summary judgment of infringement and non-infringement.

II. LEGAL STANDARD

A. Summary Judgment

"The court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a). The moving party has the initial burden of proving the absence of a genuinely disputed material fact relative to the claims in question. *Celotex Corp. v. Catrett*, 477 U.S. 317, 330 (1986). Material facts are those "that could affect the outcome" of the proceeding, and "a dispute about a material fact is 'genuine' if the evidence is sufficient to permit a reasonable jury to return a verdict for the nonmoving party." *Lamont v. New Jersey*, 637 F.3d 177, 181 (3d Cir. 2011) (quoting *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986)). The burden on the moving party may be discharged by pointing out to the district court that there is an absence of evidence supporting the non-moving party's case. *Celotex*, 477 U.S. at 323.

The burden then shifts to the non-movant to demonstrate the existence of a genuine issue for trial. *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 586–87 (1986); *Williams v. Borough of West Chester, Pa.*, 891 F.2d 458, 460–61 (3d Cir. 1989). A non-moving party asserting that a fact is genuinely disputed must support such an assertion by: "(A) citing to particular parts of materials in the record, including depositions, documents, electronically stored information, affidavits or declarations, stipulations . . . , admissions, interrogatory answers, or other materials; or (B) showing that the materials cited [by the opposing party] do not establish the absence . . . of a genuine dispute . . . ." Fed. R. Civ. P. 56(c)(1).

When determining whether a genuine issue of material fact exists, the court must view the evidence in the light most favorable to the non-moving party and draw all reasonable inferences in that party's favor. *Scott v. Harris*, 550 U.S. 372, 380 (2007); *Wishkin v. Potter*, 476 F.3d 180, 184 (3d Cir. 2007). A dispute is "genuine" only if the evidence is such that a reasonable jury could return a verdict for the non-moving party. *Anderson*, 477 U.S. at 247–49. If the non-moving party fails to make a sufficient showing on an essential element of its case with respect to which it has the burden of proof, the moving party is entitled to judgment as a matter of law. *See Celotex Corp.*, 477 U.S. at 322.

B. Patent Infringement

A patent is infringed when a person "without authority makes, uses, offers to sell, or sells any patented invention, within the United States . . . during the term of the patent . . . ." 35 U.S.C. § 271(a). "Literal infringement of a claim exists when every limitation recited in the claim is found in the accused device." *Kahn v. Gen. Motors Corp.*, 135 F.3d 1472, 1477 (Fed. Cir. 1998). "If any claim limitation is absent from the accused device, there is no literal infringement as a matter of law." *Bayer AG v. Elan Pharm. Research Corp.*, 212 F.3d 1241, 1247 (Fed. Cir. 2000).

III. DEFENDANT'S MOTION FOR SUMMARY JUDGMENT OF NON-INFRINGEMENT

A. Defendant's Argument for Non-Infringement Based on Phase Scrambling

Defendant's argument for summary judgment of non-infringement centers on phase scrambling. (D.I. 1463 at 1). Specifically, Defendant contends that the Accused Products do not perform the "computing" step and the "combining" step as recited in the claims. (*Id.*). Defendant proffers three arguments in support of this contention: (1) Plaintiff's reliance on the VDSL2 standard to prove infringement is "misplaced" as the "VDSL2 standard does not require any

specific way of performing phase scrambling;" (2) the analyzed source code does not show the "computing" step because the source code just performs a sign change; and (3) testing by Plaintiff's expert, Dr. Todor Cooklev, does not show that the Accused Products perform the "computing" and "combining" steps. (*Id.* at 1-2).

1. VDSL2 Standard

The standard at issue is the ITU-T G.993.2 standard, titled "Very high speed digital subscriber line transceivers 2" ("VDSL2"). (D.I. 1479-1, Exh. A at 47 of 163). Each of the Accused Products claims compliance with the VDSL2 standard. (*Id.* at 48 of 163). The parties disagree as to whether the VDSL2 standard requires the "computing" step of the Asserted Claims. (D.I. 1463 at 9; D.I. 1518 at 11-12).

Defendant argues that the VDSL2 standard does not require a "computing" step as Table 12-70 in the standard determines the amount by which a phase is adjusted. (D.I. 1463 at 9). Defendant contends that "Table 12-70 at most describes a look up table" and that there is "No 'computing' of the amount by which a phase is adjusted, and one of ordinary skill in the art would not understand this to constitute computing a phase shift." (*Id.* at 10).

Defendant's expert, Dr. Leonard Cimini, Jr., states, "G.993.2 does not require that a phase shift be 'computed' as recited in claim 26 of the '627 patent. All that G.993.2 requires is for the rotation to satisfy the Table 12-70." (D.I. 1477-2, Exh. B at 43-44 of 80). Based on this assertion Dr. Cimini opines, "Because the VDSL2 standard instructs that the amount of the phase shift is not independently computed but is simply the angle of rotation provided in Table 12-70, the VDSL2 standard does not require 'computing a phase shift for each carrier signal based on the value associated with that carrier signal.'" (*Id.* at 44 of 80).

Plaintiff disagrees. Plaintiff first argues that the Asserted Claims are standards essential. (D.I. 1518 at 11). Plaintiff cites its expert, Dr. Vijay Madisetti, who explained that "the Asserted Claims cover the specific quadrant scrambler operations mandated by the VDSL2 standard and such coverage does not depend on minor implementation details that would be both compliant with the standard and not encompassed by the Asserted Claims." (D.I. 1476-3, Exh. S at 33 of 99).

Plaintiff next contends that the VDSL2 standard requires the "computing" limitation. (D.I. 1518 at 11). And, Plaintiff argues, "even if the VDSL2 standard contemplates using a lookup table to compute a phase shift, no reasonable jury could find that the use of a lookup table does not meet the 'compute' element of the Asserted Claims. (*Id.* at 12). Plaintiff asserts, "Performing an operation using a lookup table on a computing device such as a transceiver meets the 'compute' element because that computational logic operation exactly determines the amount by which a phase is adjusted for each carrier signal." (*Id.*).

Dr. Madisetti opines, "All logical operations performed by the transceiver comprise a computation. Computing a phase shift is one such logical operation. The standard requires that an amount of phase shift is computed based on the output of the [pseudorandom binary sequence ("PRBS")]. . . . Determining the applicable phase shift through logical processing of the transceiver based on the output of the PRBS is most definitely a computation." (D.I. 1476-3, Exh. S at 67 of 99).

The parties disagree as to whether the use of the lookup table on a computing device meets the "compute" element of the Asserted Claims. Dr. Cimini opines that use of Table 12-70 does not meet the "computing" limitation of the claims (D.I. 1477-2, Exh. B at 44 of 80), while Dr. Madisetti is of the opinion that "[d]etermining the applicable phase shift through the logical

processing of the transceiver…is most definitely a computation." (D.I. 1476-3. Exh. S at 67 of 99). This is a genuine issue of material fact that prevents the granting of summary judgment.

At claim construction, "Plaintiff indicated that it would accept a construction that included the word 'computed,' so long as 'computed' is not understood to require a mathematical equation," and I adopted "a phase shift for each carrier signal is computed [at least] based on" as its construction. (D.I. 473 at 19). I also noted that "'computed' is not limited…to a mathematical equation." (*Id.*). Therefore, a reasonable jury could find that determining the phase shift using a lookup table meets the "compute" element of the Asserted Claims. As there is a disputed material fact regarding whether the Asserted Claims meet the "computing" limitation, summary judgment of non-infringement on this ground is denied.

Defendant also argues that the Accused Products do not perform the "combining" step as required by the Asserted Claims. (D.I. 1463 at 14). Defendant's only argument for non-infringement of the "combining" limitation was that the Accused Products did not meet the "computing" limitation, so there was nothing to "combine." (*See id.*). As there is a genuine dispute of material fact regarding whether the Accused Products meet the "computing step," it follows that there is also a genuine dispute of fact as to whether the "combining" limitation is met. Defendant's motion for summary judgment on this ground is denied.

2. Broadcom Source Code

Defendant argues that the Broadcom source code does not require computation of a phase shift. (D.I. 1463 at 11). It is not disputed that the Accused Products use Broadcom chips which function on Broadcom source code. (D.I. 1479-1, Exh. A at 67 of 163).

Defendant contends that Plaintiff's analysis of the source code fails to show that that the "computing" step of the phase shift is met. (D.I. 1463 at 12). Defendant's argument, like that for

summary judgment of non-infringement based on the VDSL2 standard, is that the "computing" step is not met because "the mere determination of a sign change is not 'computing' a phase shift." (*Id.*). Defendant asserts that the source code analysis shows that the source code determines a sign change, which is not a computation of a phase shift. (*Id.* at 11-12).

Plaintiff counters that Dr. Cimini "did not provide any written opinion to rebut Dr. Madisetti's opinion" and that "Dr. Cimini's expert report cites to portions of source code for an irrelevant software implementation of the phase scrambler that is not even used in the Accused Products." (D.I. 1518 at 9). Plaintiff also asserts that Dr. Cimini applied the "compute" limitation in a manner that is inconsistent with the Court's construction." (*Id.* at 10).

There is a disputed material fact regarding whether the Accused Products "compute" a phase shift based on the source code. Plaintiff's expert, Dr. Kevin Almeroth, identified the source code that determines the rotation of the phase characteristic. (D.I. 1479-1, Exh. A at 107 of 163). Based on this, Dr. Madisetti opines, "Determining the sign change based on the two bit value provided in training_info_out[] is a computation of a phase shift based on the two bit value provided in training_info_out[] that can then be used to adjust the phase characteristic of a 4QAM constellation point expressed in X,Y coordinates." (*Id.*). In other words, in Dr. Madisetti's opinion, the portion of the source code that determines the sign change of the phase characteristic satisfies the "computing" limitation of the Asserted Claims.

Defendant's expert, however, states, "[T]he source code in the Accused Products simply assigns a phase shift by instructing that the x_signed_inversed and/or y_signed_inversed flag values should be applied to the phase characteristic of the carrier signal, according to the value of the PRBS." (D.I. 1477-2, Exh. B at 46 of 80). Dr. Cimini opines, "The mere assignment of a

phase shift to a carrier signal, fixed according to the value of the PRBS, is a simple mapping of one value to another, not a calculation or other means of 'computing' a phase shift." (*Id.*).

As discussed above, the parties' experts have differing opinions of whether determining a sign change satisfies the "computing" limitation of the Asserted Claims. (*Compare* D.I. 1479-1, Exh. A at 107 of 163 *with* D.I. 1477-2, Exh, B at 46 of 80). It is for the jury to decide whether the determination of the sign change satisfies the "computing" limitation in the Asserted Claims. Summary judgment is denied on this ground.

3. Dr. Cooklev's Testing

Defendant argues that Dr. Cooklev's tests do not show that the Accused Products compute the phase shift. (D.I. 1463 at 12). Defendant contends that Dr. Cooklev's tests analyzed the signal produced by the Accused Products, but not how the signal was generated or processed by the transceiver. (*Id.* at 13). Plaintiff counters that Dr. Cooklev's tests demonstrate that the Accused Products perform phase scrambling in compliance with the VDSL2 standard. (D.I. 1518 at 13). Plaintiff argues that Dr. Cooklev's tests provide evidence of infringement. (*Id.*).

Based on the VDSL2 standard and the source code evidence, there is a genuine issue of material fact regarding whether the Accused Products satisfy the "computing" limitation of the Asserted Claims. As this is already an issue for the jury to decide, it is not necessary to determine whether or not Dr. Cooklev's tests also create a genuine issue of material fact regarding the "computing" limitation.

B. Doctrine of Equivalents

Defendant argues that its Accused Products do not infringe under the doctrine of equivalents, as Plaintiff's expert has failed to show that the "computing" and "combining" limitations are met.[1] (D.I. 1463 at 14-16).

For the "computing" limitation, Defendant asserts that Dr. Madisetti's "function" and "way" analyses fail to demonstrate infringement under the doctrine of equivalents. (*Id.* at 15). Defendant argues that Dr. Madisetti's analysis of the "function" prong misstates the claim language and ignores the Court's claim construction. (*Id.*). Defendant also contends that Dr. Madisetti's "conclusory opinion" of the "way" prong does not address how the claim language or the Accused Products perform the "computing" step. (*Id.*). Defendant further argues that Plaintiff has not presented evidence that the "combining" limitation is met under the doctrine of equivalents because Dr. Madisetti's only analysis is an "entirely conclusory statement." (*Id.* at 16).

Lastly, Defendant asserts that Dr. Madisetti's doctrine of equivalents opinion is insufficient, as his "doctrine of equivalents opinion ignores the distinct steps of computing a phase shift, then combining the computed phase shift to achieve a substantially scrambled signal." (*Id.* at 16-17). Defendant argues that Dr. Madisetti's opinion is based on the "idea that the final output of the 2Wire Accused CPE Product is a transmission signal that has been subjected to some kind of phase scrambling regardless of how it is done," which is insufficient under the law. (*Id.* at 16).

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[1] Defendant also filed a motion to strike portions of Dr. Madisetti's Second Amended Report (D.I. 1534), on the basis that a new doctrine of equivalents theory was improperly introduced after Plaintiff's final infringement contentions. (D.I. 1535 at 1). Defendant's arguments on this issue are addressed in a separate opinion. (*See* D.I. 1583).

Plaintiff disagrees. Plaintiff contends that Dr. Madisetti has sufficiently analyzed the doctrine of equivalents and has "addressed how the 'compute' and 'combine' elements of the Asserted Claims are met under the DOE." (*Id.* at 16-17).

I agree with Plaintiff that Dr. Madisetti has addressed how the "compute" and "combine" limitations in the Asserted Claims are met under the doctrine of equivalents. Dr. Madisetti opines, "[T]he source code performs substantially the same function, in substantially the same way, to produce the substantially the same result." (D.I. 1475-8, Exh. H at 108 of 133). Dr. Madisetti states:

> The function of the "compute" claim element is to determine the adjustment to be applied to the phase characteristic modulated on to a carrier signal based on the output of a pseudorandom number generator that is associated with that carrier signal (or in the case of. . . claim 26 of the '627 patent, based on a value determined independently of the input bit stream). The source code performs this same function.

(*Id.*). Dr. Madisetti also opines as to the "way" the "compute" limitation is carried out:

> The way the "compute" claim element is carried out is to compute a phase shift based on the pseudorandom number. In the case of a fixed 4-QAM modulation, the phase shift is one of four values. Again, with only four possible phase shifts and no variation in amplitude, a two-bit value[] defines the amount of the phase shift (or phase adjustment). Accordingly, there is no meaningful or substantial difference between representing the phase shift as a two-bit value or a sign adjustment for the coordinates of the phase characteristic or a number of degrees or radians or as a complex conjugate pair.

(*Id.* at 109 of 133).

Dr. Madisetti describes how the "function" and "way" portions of the doctrine of equivalents is satisfied for the "computing" limitation. Defendant has not shown that there is no genuine issue of material fact in Plaintiff's doctrine of equivalents argument that would merit the granting of summary judgment.

Dr. Madisetti's report also explains Plaintiff's doctrine of equivalents argument for the "combine" limitation:

> [T]he source code produces the same result – combining the phase characteristic and phase shift. When combining 4-QAM phase characteristics with one of four phase adjustments, using a sign change requires less computation and produces the same result. The source code performs substantially the same function – combining the phase characteristic with the phase shift, in substantially the same way – using the case statement logic, to achieve substantially the same result – a multicarrier transmission signal with a reduced peak-to-average power ratio.

(*Id.* at 117 of 133). Dr. Madisetti's analysis of the doctrine of equivalents for the "combine" limitation is not conclusory. In his report, Dr. Madisetti opines as to the how the source code functions to meet the limitations of the claims. (*Id.* at 96-99, 106-08, 116-17, 119-20, 128-29, 131-32 of 133). In his doctrine of equivalents opinions, Dr. Madisetti uses this source code analysis to opine that the source code proves that the Accused Products infringe under the doctrine of equivalents. (*Id.* at 108-09, 117 of 133).

Dr. Madisetti's doctrine of equivalents analysis is not insufficient or conclusory, and Defendant has not shown that there is no genuine issue of material fact. Therefore, summary judgment is denied on this ground.

C. Non-Infringement of Claim 26 of the '627 Patent

Defendant moves for summary judgment of non-infringement of Claim 26 of the '627 Patent. (D.I. 1463 at 17). This claim requires a "transmission signal having a plurality of carrier signals for modulating an input bit stream." '627 Patent at cols. 11:65-12:1. Defendant contends that an "input bit stream"" comes from a source external to the transceiver. (D.I. 1463 at 17). Based on this, Defendant argues that its products do not infringe as the initialization messages on which Plaintiff's infringement theory relies are generated by the transmitter itself and do not meet the "input bit stream" limitation." (*Id.*).

Plaintiff argues that the initialization messages satisfy the "input bit stream" limitation. (D.I. 1518 at 17). Plaintiff asserts that the Court has already prevented an expert of Defendant

Adtran, Inc. (C.A. No. 14-cv-954-RGA) from construing "input bit stream" in this way. (*Id.*).[2]Further, Plaintiff contends that nothing in the claim itself requires an "input bit stream" to have a source outside the transceiver and that "a POSITA would recognize that an 'input bit stream' can be any bits that are input to a functional block internal to the transceiver." (*Id.* at 18).

The parties dispute whether the initialization messages in the Accused Products meet the "input bit stream" limitation in the Asserted Claims.

Defendant's expert, Dr. Cimini, opines, "One of ordinary skill in the art would understand that the 'input bit stream' is the bit stream that comes from a data source external to the transceiver." (D.I. 1477-2, Exh. B at 36). In Dr. Cimini's opinion, a POSITA would not understand "input bit stream" and "bit stream" to have the same meaning. (*Id.* at 36-37). In contrast, Plaintiff's expert, Dr. Madisetti, states that a POSITA would "recognize that an 'input bit stream' can be any bits input to a functional block (hardware and/or software module) internal to the transceiver." (D.I. 1476-3, Exh. S at 54). Thus, there is a disputed material fact as to whether what Plaintiff contends is the infringing "input" is or is not an "input bit stream" under the Asserted Claims. As there is a disputed material fact as to whether the initialization messages satisfy the "input bit stream" claim limitation, it follows that there is a disputed material fact as to whether the Accused Products infringe. This is for the jury to decide.

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[2] As both parties noted in their briefs, a similar issue arose in *TQ Delta, LLC v. ADTRAN, Inc.* (C.A. No. 14-954-RGA). In that case, I declined to import the limitation that an "input bit stream" must come from a source external to a transceiver into the asserted claims. *TQ Delta, LLC v. ADTRAN, Inc.*, C.A. No. 14-954-RGA, D.I. 1181 at 6. However, in a decision on a motion in limine, I concluded, "Defendant's expert cannot construe 'input' but can say (if it is a fact) that whatever Plaintiff is pointing to as an input is not an input because it does not come from an external source." *TQ Delta, LLC v. ADTRAN, Inc.*, C.A. No. 14-954-RGA, D.I. 1201 at 2.

Therefore, Defendant's motion for summary judgment of non-infringement of Claim 26 of the '627 Patent is denied.

D. Non-Infringement of Claim 14 of the '041 Patent

Defendant argues that its Accused Products do not infringe Claim 14 of the '041 Patent. (D.I. 1463 at 17). Defendant contends that Claim 14 of the '041 Patent requires that the products be configured in a certain manner to infringe and that Plaintiff has not produced evidence to show that the Accused Products are configured in a way that uses VDSL2 or that would infringe. (*Id.* at 17-18).

Plaintiff counters that it is "only required to show that the Accused Products have the ability to perform the claimed functionality." (D.I. 1518 at 19). And, Plaintiff argues, while it is irrelevant as to what is required to show infringement, the Accused Products are "default provisioned in VDSL2 mode," and the Accused Products use the infringing functionality every time they are operated in VDSL2 mode. (*Id.* at 20). Plaintiff also asserts that Defendant has never set forth a non-infringement defense based on actual use, so its "belated attempt" to do so at the summary judgment stage should be rejected. (*Id.* at 19).

Defendant's cursory briefing on this issue fails to establish that a reasonable jury could not find that Defendant's products infringe the Asserted Claims. (*See* D.I. 1463 at 17-18; D.I. 1532 at 10). It is undisputed that each of the Accused Products claims compliance with the VDSL2 standard. (D.I. 1479-1, Exh. A at 48 of 163). Further, Plaintiff has evidence that establishes that the Accused Products have a default configuration of VDSL2 and that one of Defendant's customers has a dedicated VDSL network that the Accused Products support and on which they operate. (D.I. 1476-3, Exh. S at 19-20 of 99). Thus, Defendant fails to show that the

Accused Products undisputedly do not infringe Claim 14 of the '041 Patent. Therefore, summary judgment on this argument is denied.

IV. PLAINTIFF'S MOTION FOR SUMMARY JUDGMENT OF INFRINGEMENT

Plaintiff filed a dueling motion for summary judgment of infringement on all of the Asserted Claims. (D.I. 1478).

A. Infringement of Claim 14 of the '041 Patent

Plaintiff argues that there is no genuine dispute that the Accused Products include every element of Claim 14 of the '041 Patent. (D.I. 1469 at 1). Plaintiff contends that Dr. Madisetti addresses how each element of Claim 14 is met by the Accused Products, based on analysis of source code and simulations performed using MatLab. (*Id.* at 1-2). Plaintiff asserts that Dr. Madisetti and Dr. Kevin Almeroth analyzed the source code "found in a functional block of the DSL chipset referred to as the 'QProc' block." (*Id.* at 2). Plaintiff argues that Defendant's experts did not provide any opinions regarding the QProc source code, and therefore, there is no genuine dispute that the Accused Products infringe Claim 14 of the '041 Patent. (*Id.* at 2-3).

Defendant counters, "neither the VDSL2 standard nor any of the Accused 2Wire Products compute any phase shift; they simply use the phase shifts set forth in Table 12-70." (D.I. 1514 at 8). Defendant, much like in its briefing for its motion for summary judgment of non-infringement, then argues that Plaintiff's evidence is insufficient to prove that the Accused Products meet the "computing" limitation and therefore infringe the Asserted Claims. (*Id.* at 9-13).

While framed differently, the dispute is the same as one raised in Defendant's motion for summary judgment of non-infringement: whether the source code indicates that the Accused Products satisfy the "computing" limitation.

Dr. Madisetti opines that the "source code analysis shows that each of the Accused Products is capable of determining a phase shift for each carrier signal based on the value associated with that respective carrier signal." (D.I. 1475-8, Exh. H at 129 of 133). Specifically, in Dr. Madisetti's opinion, the QProc block performs quadrant descrambling in the receive path. (*Id.* at 89 of 133). He states, "quadrant scrambling/descrambling is also referred to as quadrant modulation and involves the rotation of phase characteristic of a carrier by 0, 90, 180 or 270 degrees as provided in the ITU-T standards." (*Id.* at 90 of 133). In other words, Dr. Madisetti's opinion is that the QProc source code block performs the quadrant modulation, including the "computing" limitation for Claim 14 of the '041 Patent. Based, in part, on this, Dr. Madisetti concludes that the Accused Products infringe Claim 14 of the '041 Patent. (*Id.* at 129, 132 of 133).

On the other hand, Defendant's expert maintains the position that the "computing" element is not satisfied as the "Accused Products do not perform phase shifting as recited in the Asserted Claims, either in the transmit direction, . . . or in the reverse direction, as in claim 14 of the '041 patent." (D.I. 1476-8, Exh. X at 56 of 80). Dr. Cimini states that he reviewed the expert report of Dr. Goldberg, which "shows that a pseudorandom noise (PRN) code is applied directly to bits of data transmitted, as opposed to rotating constellation points resulting from a constellation mapping of the data." (*Id.* at 45 of 80). He continues, "In contrast, G.993.2 [the VDSL2 standard] instructs that the data bits first be modulated according to a 4-QAM modulation scheme, assigning a constellation point for each data bit and then rotating that constellation point according to the value assigned by Table 12-70." (*Id.*). For this reason, Dr. Cimini disagrees that the Broadcom software alone meets the "computing" limitation. (*Id.*).

Dr. Cimini also opines:

> It is my opinion that the source code does not support a finding of infringement. In particular, while Dr. Madisetti relies on Dr. Almeroth's analysis to opine that "the BCM6368 and BCM63168 firmware use the same source code functions to implement the functionality associated with the claim elements" (Madisetti Report, ¶ 162), Dr. Almeroth does not describe in any detail any Broadcom software or QProc code that encodes or modulates data to be transmitted. Thus, Dr. Madisetti has not shown that the BCM6368 and BCM63168 firmware supports a finding of infringement.

(D.I. 1476-8. Exh. X at 20 of 80).

It is clear that the parties' experts have differing opinions on the source code and whether or not the Accused Products' source code infringes Claim 14 of the '041 Patent. This is a genuine issue of material fact for the jury to decide. Summary judgment for infringement of Claim 14 of the '041 Patent is, therefore, denied.

B. Infringement of Claim 14 of the '008 Patent and Claim 26 of the '627 Patent

Plaintiff argues that it has shown that the Accused Products meet each element of Claim 14 of the '008 Patent and Claim 26 of the '627 Patent and, therefore, it is entitled to summary judgment of infringement. (D.I. 1469 at 12-18). For each claim element, Plaintiff outlines its evidence (the VDSL2 standard, source code analysis, and testing by Dr. Cooklev) and contends that Defendant has not provided evidence to counteract their infringement evidence. (*Id.*).

Defendant's arguments against summary judgment of infringement align closely with the arguments in its briefing for summary judgment of non-infringement. *See* Section III.A (describing Defendant's assertions that the Accused Products do not infringe the Asserted Claims). Overall, Defendant contends that Plaintiff's evidence does not show that the Accused Products perform the "computing" element or the "combining" element of the Asserted Claims. (D.I. 1514 at 8-13).

As all claim elements must be met for infringement, a genuine dispute of fact in one of the claim elements is a sufficient basis to deny a motion for summary judgment. *See Kahn*, 135

F.3d at 1477. As there is a genuine dispute of fact as to infringement of the relevant claim elements,[3] I will deny Plaintiff's motion on that ground and will not address the other claim elements.

This element of both claims requires "computing a phase shift for each carrier signal based on the value associated with that carrier signal." The parties' experts dispute whether the "computing" limitation is satisfied, which is a genuine issue of material fact that precludes the granting of summary judgment of infringement on this ground.

C. Compliance with the VDSL2 Standard

Plaintiff argues that summary judgment of infringement should be granted as the "Asserted Claims map to mandatory portions of the VDSL2 standard, and because 2Wire advertises to its customers and to the general public that the Accused Products are standard-compliant devices." (D.I. 1469 at 18). Plaintiff asserts that Dr. Madisetti opined, "[E]ach of the elements of the Asserted Claims reads on the mandatory portions of the VDSL2 standard," and, "Dr. Madisetti supported his opinion by comparing each limitation of the Asserted Claims with mandatory portions of the VDSL2 standard." (*Id.* (quoting D.I. 1475-8, Exh. H at 84 of 133)). Plaintiff contends that its "experts have shown that there is no way to implement quadrant scrambling and redundant transmission of bits of initialization messages on multiple carriers as mandated by VDSL2 without infringing the Asserted Claims." (*Id.* at 19).

Defendant contends that Plaintiff's "reliance on the VDSL2 standard to try to prove infringement is misplaced." (D.I. 1514 at 1). Defendant first argues that the VDSL2 standard does not require the "computing" limitation as the phase shifts are "supplied by Table 12-70 of the standard." (*Id.* at 9). Defendant then asserts that beyond providing conclusory statements,

[3] "14[c]" and "20[c]" are how Dr. Madisetti refers to the relevant claim elements.

"Dr. Madisetti provides no opinion or analysis showing that the Asserted Claims are necessarily practiced by the standard." (*Id.* at 10). Further, Defendant argues that "there are a number of ways that a transceiver can process a bit stream to yield the result in Table 12-70 that do not use the Family 4 Asserted Claims." (*Id.*).

There is a disputed material fact whether the Accused Products are standards essential. Dr. Madisetti opines that the Accused Products are. He states, "[E]ach of the elements of the Asserted Claims reads on the mandatory portions of the VDSL2 standard," and, "[T]he Accused Products necessarily include the capabilities and functionality that is mandated by the VDSL2 standard, including the operations described in Section 12.3 of the standard." (D.I 1475-8, Exh. H at 84, 87 of 133).

In contrast, Dr. Cimini opines, "A standards document does not necessarily dictate every facet of the operation of a product, even when that product complies with the standard." (D.I. 1476-8, Exh. X at 21 of 80). Dr. Cimini states, "The VDSL2 standard, however, does not require 'computing' a phase shift for each carrier signal. Instead, the VDSL2 standard provides a table whereby a carrier signal may be rotated, i.e., phase shifted." (*Id.* at 29 of 80). Dr. Cimini concludes that the "Asserted Claims do not read on the mandatory portions of the VDSL2 standard," and notes "that each of the Accused 2Wire Products can operate in other modes, and support other standards in addition to VDSL2." (*Id.*).

The parties' experts disagree as to whether the Asserted Claims read on the mandatory portions of the VDSL2 standard and are standards essential. This is a disputed material fact to be determined by the jury and, thus, summary judgment is denied.

V. CONCLUSION

For these reasons, Defendant's motion for summary judgment of non-infringement for Family 4 (D.I. 1462) and Plaintiff's motion for summary judgment of infringement for Family 4 (D.I. 1468) are denied.

A separate order will be entered.